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2007 AGENT-DIRECTED SIMULATION SYMPOSIUM (ADS'07)

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ADS'07 PREFACE

On behalf of the organizing committee of the 2007 Agent-directed Simulation Symposium (ADSS), we wish to welcome you to Norfolk, VA, USA. ADSS is taking place within the 2007 Spring Simulation Multiconference, which is sponsored by the Society for Modeling and Simulation International in collaboration with ACM/SIGSIM. This year ADSS is also co-sponsored by the McLeod Modeling and Simulation Network (M&SNet), which is a consortium of cooperating independent organizations active in professionalism, research, education, and knowledge dissemination in the modeling and simulation (M&S) domain.

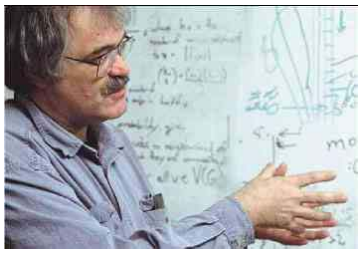
The growth of new advanced distributed computing standards along with the rapid rise of e-commerce is providing a new context that acts as a critical driver for the development of next generation systems. These standards revolve around service-oriented technologies, pervasive computing, web-services, Grid, autonomic computing, ambient intelligence etc. The supporting role that intelligent agents play in the development of such systems is becoming pervasive, and simulation plays a critical role in the analysis and design of such and many other types of systems.

Currently, there exist many agent symposia, as well as agent-based social simulation conferences. However, there are not many simulation conferences where agent and simulation technology are together a central theme. It is therefore that the ADS symposium fills a gap in the agent community as well as the simulation community. Through the theme of agent-directed simulation (with emphases to agent simulation and agent-based as well as agent-supported simulations), the symposium will bring together agent technologies, tools, toolkits, platforms, languages, methodologies, and applications in a pragmatic manner. In this symposium, established researchers, educators, and students are encouraged to come together and discuss the benefits of agent technology in their use and application for simulation. It is a way for people to discuss why and how they have used agent technology in their simulations, and describe the benefit of having done so.

Many people contributed to making ADS 2007 a success. The efforts of the Scientific Program Committee and referees were instrumental in shaping the program by facilitating the peer-review process as well as in supporting the organization of the symposium. We extend our sincere thanks to the ADS 2007 authors. Also, Dr. Maarten Sierhuis and Chin Seah from NASA Ames Research Center kindly accepted our invitation to deliver a tutorial on their widely accepted and successful simulation development environment: BRAHMS. Finally, we would like to thank Wayne Ingalls, who supervised the production of the proceedings with great professionalism. Given the quality of the papers submitted to this year's symposium, we are hopeful that future ADS symposiums will continue to build on this success to emerge as a platform that hosts a variety of workshops related to theory, methodology, and applications of agent-directed simulation. On behalf of the conference organizers and the Scientific Program Committee, we hope everyone enjoys this year's outstanding program.

Sincerely,

Dr. Tuncer Ören
General Chair



Dr. Gregory R. Madey
Symposium Co-chair

Dr. Maarten Sierhuis
Symposium Co-chair

Dr. Levent Yilmaz
Symposium Co-chair

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Modeling and Simulation with the Brahms Agent Environment

Tutorial Sessions

Presenters

Maarten Sierhuis, Ph.D.
USRA/RIACS - NASA Ames Research Center
Maarten.Sierhuis-1@nasa.gov

Chin Seah
SAIC- NASA Ames Research Center
cseah@mail.arc.nasa.gov

What is Brahms?

Brahms (http://www.agentisolutions.com) is an agent-based modeling and simulation environment

a. for developing simulations of people, organizations, objects such as tools, documents and systems and
b. for designing, simulating and implementing multi-agent software systems.

The Brahms environment includes an agent-oriented language, compiler and virtual machine, as well as a development environment and a post-execution viewer of agent execution, communication and interaction. Brahms models are not like traditional task or functional analysis of work processes that leave out people's practices, especially how environmental conditions come to be detected and how problems are resolved. Cognitive modeling tools (e.g. SOAR, ACT-R) focus on detailed modeling of individual cognitive tasks. In contrast, Brahms focuses on how informal, circumstantial, and located behaviors of a group of individuals interact, where communication and synchronization occurs, such that the task contributions of people and machines flow together to accomplish goals. Brahms can also be used to design and implement software agents that incorporate models of people's work practice. Brahms enables the creation of multi-agent models that include aspects of reasoning found in cognitive models, task execution, plus the impact of geography, such as agent movement and physical changes in the environment.

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What will be part of the Brahms Tutorial?

The tutorial will provide an overview of the Brahms language using the development environment and post-execution viewer. By considering a simple *"day in the life of a student"* scenario we will show the use of Brahms as an agent-based modeling and simulation tool.

1.1.1.1. Requirements:

Attendees are ***strongly*** encouraged to bring a laptop running Microsoft XP to install Brahms, view the model and run a simulation.

1.1.1.2. Handouts:

1. A set of presentation slides (created in Microsoft PowerPoint™) to accompany the lecture
2. A CD containing the Brahms environment, documentation of tutorial, Brahms tutorial model & simulation and the Brahms website (http://www.agentisolutions.com).

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Presenters Biographies

MAARTEN SIERHUIS is a senior research scientist at the Research Institute for Advanced Computer Science (RIACS is an institute of the Universities Space Research Association at NASA Ames Research Center), where he manages the Brahms project on modeling and simulating work practice. His research interests are agent-oriented languages and their application to the development of human-centered systems. Before joining RIACS, he was a member of the Work Systems Design group and the Expert Systems laboratory of NYNEX Science & Technology. He also developed expert systems as a senior knowledge engineer at IBM and in the Netherlands. He received an engineering degree in Higher Informatics from the Hague Polytechnic and a Ph.D. from the Department of Social Science Informatics at the University of Amsterdam.

CHIN SEAH is a computer scientist at Science Applications International Corporation (SAIC), working at NASA Ames Research Center on the Brahms project. He is applying the Brahms work system design and modeling approach to the MER mission operations system. Before joining the Brahms team, he worked as a business process management consultant at Andersen Consulting and as a knowledge engineer at Mindbox, Inc. implementing rule-based and case-based expert systems. He has a B.S. in computer engineering from Santa Clara University and an M.S. in computer information science from the University of Pennsylvania where he did research in natural language processing and computer graphics.

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2007 DEVS INTEGRATIVE M&S SYMPOSIUM (DEVS'07)

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DEVS'07 PREFACE

Welcome to the third DEVS Integrative M&S Symposium (DEVS'07), which is part of the 2007 Spring Simulation Multi-conference sponsored by the Society for Modeling and Simulation International. The goal of this annual DEVS Integrative M&S Symposium is to foster continuing research and to promote broader practice of DEVS based modeling and simulation.

This year's symposium exhibits a wide variety of topics, including modeling and simulation methods, simulation over SOA, formal analysis, modeling and simulation environments, and several applications of DEVS based modeling and simulation. Web-based modeling and simulation, and the role of Service Oriented Architectures in large scale M&S projects, has received particular attention this year. In fact, a special session on Collaborative Execution and Systems Modeling over SOA is devoted to this topic.

Many people have contributed to making DEVS 2007 a success. We thank all the authors, steering committee, program committee, and referees for their efforts. Thanks also to Wayne Ingalls and other SCS staff members who helped to make this Symposium, and the entire SpringSim event, a success. The DEVS Symposium continues to grow, attracting a broad variety of researchers. We hope that the DEVS Symposia will continue to grow and emerge as a major forum for presenting and promoting research on DEVS-based modeling and simulation. A webpage for the symposium (at http://www.ornl.gov/~1qn/DEVS) has been setup to help publicize and consolidate these efforts. We look forward to your on-going contributions to future DEVS Symposiums!

James Nutaro and Xiaolin Hu
DEVS 2007 Program Chairs

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2007 HIGH PERFORMANCE COMPUTING SYMPOSIUM (HPC'07)

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HPC'07 PREFACE

Welcome to the 15th High Performance Computing Symposium (HPC 2007), devoted to the impact of high performance computing and communications on computer simulations, held as part of the 2007 Spring Simulation Multiconference (SMC'07).

Advances in networking, high end computers, large data stores, and middleware capabilities are ushering in a new era of high performance parallel and distributed simulations. However, along with these opportunities come new challenges. The goal of this 2007 symposium is to encourage innovation in high performance computing and communication technologies and to stimulate the use of these technologies in key areas of computer simulation. It will promote the exchange of ideas and information between universities, industry, and national laboratories through the development of high performance computing and communication applications that, in turn, can provide solutions to current scientific and technical challenges. Broad areas of interest include high performance applications, high performance software tools, distributed and grid computing, visualization and data management, problem solving environments, parallel algorithms and architectures, and high performance discrete event simulation.

HPC 2007 is the 15th in a series of international symposia aimed at promoting the exchange of ideas, information, and novel developments among universities, national laboratories, and industry. This year's symposium features a keynote lecture by David Keyes of Columbia, and a special session on component-based high performance applications organized by Masha Sosonkina. The high quality papers that appear in these proceedings were thoroughly refereed, and represent a diverse set of high performance computing and communications topics. Some papers in the DEVS Integrative Modeling and Simulation Symposium and the Business and Industry Symposium may also be of interest to HPC2007 attendees.

This event and program would not have been possible without the dedicated efforts of the steering and program committees. We are grateful to the program committee for their timely reviewing and work in assembling such an excellent program, and to the authors who submitted the high quality material from which that program was selected. We also thank the members of the steering committee, especially Manish Parashar of Rutgers and Andreas Stathopoulos of the College of William and Mary, for their guidance and advice. Those at SCS involved in the organization and production details, notably Steve Branch and Wayne Ingalls, were indispensable in making everything happen on time.

Again, we welcome you to Norfolk and hope that you will find HPC 2007 an interesting and rewarding event.

Layne T. Watson
HPC 2007 General Chair

Tomasz Haupt, Clifford A. Shaffer, Masha Sosonkina
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Mathematical Software for High-end Computational Science and Engineering

David Keyes
Fu Foundation Professor of Applied Mathematics,
Columbia University

Multiscale, multirate scientific and engineering applications based on systems of partial differential equations possess resolution requirements that are typically inexhaustible and demand execution on the highest-capability computers available, which will soon reach the petascale. While the variety of applications is enormous, their needs for mathematical software infrastructure are surprisingly coincident. Domains with complex geometry require versatile meshing and discretization tools. Resolution requirements that evolve with the solution require dynamic adaptivity. Implicit methods for stable and accurate integration of transient problems and efficient treatments for equilibrium problems lead to large, ill-conditioned algebraic systems that must be solved with an algorithmic complexity that is close to linear in problem size or storage complexity. Distributed memory architectures demand efficient means of creating and managing load-balanced partitions of unstructured objects. These and other algorithmic challenges that are generic to nearly all mesh- and particle-based applications are addressed in the SciDAC Institute and Centers for Enabling Technologies in mathematics, which we briefly overview in this talk.

The chief to bottleneck to scalability is often the solver. At their current scalability limits, many applications spend a vast majority of their operations in solvers, due to solver algorithmic complexity that is superlinear in the problem size, whereas other phases scale linearly. Furthermore, the solver may be the phase of the simulation with the poorest parallel scalability, due to intrinsic global dependencies. The Towards Optimal PDE Simulations (TOPS) center focuses on relieving this bottleneck while providing a multilevel programming interface that allows users to advance from initial concerns of correctness and robustness to ultimate concerns of efficiency and performance portability.

David E. Keyes is the Fu Foundation Professor of Applied Mathematics in the Department of Applied Physics and Applied Mathematics at Columbia University, an affiliate of the Center for Data Intensive Computing (CDIC) at Brookhaven National Laboratory, and Acting Director of Institute for Scientific Computing Research (ISCR) at the Lawrence Livermore National Laboratory.

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